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# NDT STANDARDS FROM THE PERSPECTIVE OF THE DEPARTMENT OF DEFENSE

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ENGINEERING STANDARDIZATION BRANCH

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## ABSTRACT

This presentation illustrates the interaction of the DoD non-Government Society (NGS) bodies in the area of NDT. The adoption process for NGS will be outlined including the criteria for adoption, what adoption means, and the advantages of DoD/NGS interaction.

The tasks of the DoD's Standardization Program Plan for NDT will be described along with DoD's efforts on a Joint Army, Navy, Air Force (JANNAF) NDE Subcommittee and on an international standardization group (America, Britain, Canada, and Australia) called the Quadripartite Working Group on Proofing, Inspection, and Quality Assurance.

## NDT Standards from the Perspective of the Department of Defense

**REFERENCE:** Strauss, B., "NDT Standards from the Perspective of the Department of Defense," *Nondestructive Testing Standards—Present and Future*, ASTM STP 1151, H. Berger and L. Mordfin, Eds., American Society for Testing and Materials, Philadelphia, 1992, pp. 126–135.

**ABSTRACT:** This presentation illustrates the interaction of the DoD non-Government Society (NGS) bodies in the area of NDT. The adoption process for NGS will be outlined including the criteria for adoption, what adoption means, and the advantages of DoD/NGS interaction.

The tasks of the DoD's Standardization Program Plan for NDT will be described along with DoD's efforts on a Joint Army, Navy, Air Force (JANNAF) NDE Subcommittee and on an international standardization group (America, Britain, Canada, and Australia) called the Quadripartite Working Group on Proofing, Inspection, and Quality Assurance.

**KEY WORDS:** DoD standardization, NDT, nondestructive testing standardization

It is in the best interests of the Department of Defense (DoD) to interact closely with non-Government standards (NGS) bodies in an attempt to develop usable standardization documents. This paper will study that interaction by indicating how the DoD interacts, how it adopts, what type of documents it adopts, what adoption means, and the advantages or working closely with NGS bodies.

The DoD, by means of a Standardization Program Plan for NDT, outlines its tasks for the next two years. In review of these tasks, it will become apparent that most tasks involve NGS bodies. An ideal approach is for DoD to initiate a project, build up a draft document, and then introduce it into an NGS group. Consequently, many DoD documents have been formatted into ASTM form, and hopefully DoD will adopt the ASTM document (depending on the type of NGS changes) and cancel its military document. This paper will also highlight DoD's efforts in JANNAF (Joint Army, Navy, NASA, and Air Force) efforts in nondestructive evaluation. The JANNAF NDE Subcommittee involves mostly persons other than those active in ASTM or SAE work. Also, this paper will highlight DoD's efforts in international standardization, particularly the Army's work in the ABCA (America, Britain, Canada, and Australia) Quadripartite Working Group on Proofing, Inspection and Quality Assurance.

### Criteria for Adoption

Adoption by the DoD indicates acceptance. If a non-Government standard (NGS) is adopted, it is listed in the Department of Defense Issue of Specifications and Standards (DOD-ISS), which is available at all DoD standardization offices, and the document is given more

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formal consideration in the hierarchy of documents for selection in design. In addition, each ASTM document adopted contains the following caption directly under its title: "This practice (standard or other) has been approved for use by agencies of the Department of Defense and for listing in the DoD Index of Specifications and Standards." Documents are adopted to indicate preference for their use and to increase their visibility. Presently documents are adopted by specific issue, and revisions are not automatically adopted. This allows DoD to not adopt a revision containing undesirable changes.

Non-Government documents are adopted when it is feasible, economical, and practical. Two criteria must be met:

1. Is an NGS available which meets or with minor modification can be made to meet all needs of the DoD with respect to technical requirements and policies?
2. Will an NGS be available in time to meet DoD needs?

Documents proposed for adoption by the DoD must be readily available to the DoD and its contractors. The basic requirement is that sufficient copies of documents be available, either purchased or printed with permission, to meet DoD needs, and that documents be available to contractors from the non-Government standards body (NGSB). Many NGsBs have stated availability conditions necessary to the process of having their standards adopted by the DoD. For example, ASTM will provide DoD with one free copy of any document and grants royalty-free license to reproduce for DoD coordination review purposes only.

Non-Government standards can be referenced in military documents. Generally, referenced documents should be adopted to ensure availability of the specific issue reference.

#### **The Adoption Process**

The DoD has adopted many ASTM and SAE documents and uses adopted documents interchangeably with military documents. In the area of NDT, approximately one third of the 90 documents listed in DoD standardization AREA NDTI are non-Government documents (NGS). Area NDTI comprises all DoD specifications, standards, and handbooks and adopted NGS that deal with NDT methodology. The Army Materials Technology Laboratory (MTL) is the lead standardization activity for this area. I am the DoD liaison representative to ASTM E7, which is responsible for writing NDT method documents. ASTM E7 documents are referenced in hundreds of military and ASTM documents that cover various applications.

The DoD, National Institute of Standards and Technology, and the Naval Surface Warfare Center have been working with non-Government groups in the development of standards of mutual interest for many years. They have assumed leadership positions such as committee and subcommittee chairmanships on many non-Government committees and have aided in the development of documents with proper requirements and in their opinions satisfactory to the DoD. However, they are not in a position to ensure DoD approval of the documents. It is necessary to work within the DoD standardization system to ensure that there is a definite need for the document and that the documents are written in an acceptable manner. To ensure the adoption of a non-Government document, it is necessary to coordinate non-Government drafts beginning with the first draft of a proposed document through the proper DoD channels. To accomplish this, the DoD representative identifies the DoD standardization activities responsible for reviewing the particular non-Government document within the DoD. DoD representatives also contact DoD technical personnel knowledgeable on the particular document who may be missed by the standardization offices. It is important that one coordinated reply be sent to the NGS body.

### **Speeding Up Adoption by DoD-NGS Activities Working Together**

DoD and non-Government bodies working in unison on projects independent of who started the task is the key to faster acceptance of the product of the work of both the Government and the non-Government bodies. An example of a non-Government initiated project is a General Electric radioscopes proposal which will be worked on by DoD and Industry and finally published as a military standard. This document will supply requirements for the "practice section" of ASTM Practice for Radioscopic Real Time Inspection (E 1255) and hopefully will be incorporated into that document (see radioscopes paragraph of this paper). For non-Government bodies to participate in Government-initiated projects, they must have knowledge of what is happening in DoD standardization. This is now accomplished by DoD standardization personnel participating in non-Government activities and presenting talks on DoD activities.

It is important to encourage non-Government bodies to become involved in DOD-initiated projects as many of the DOD projects end up with publication of non-Government documents. An example is ASTM Test Method for Primary Calibration of Acoustic Emission Sensors (E 1106-86). This was a DoD project with the bulk of the work performed by the National Institute of Standards and Technology (NIST), formerly the National Bureau of Standards, under contract to MTL but with heavy input from the ASTM E07.04 subcommittee. The final product was an adopted ASTM document. Other examples are projects for reference radiographs for aluminum welds, titanium castings, and thick-wall aluminum castings. These projects were all seeded with DOD start-up money, have heavy DoD and ASTM input, and will be published as adopted ASTM documents. The titanium reference radiograph document was recently published.

The question arises, how can non-Government standardization bodies become aware of DoD-NDT projects in progress beyond the means previously described? One approach is by using the NDTI Program Plan. This document contains compilation of projects comprising most of the major ongoing NDT standardization tasks planned by DoD. Updates on tasks in the Program Plan are presented periodically at various DoD, ASTM, and ASNT meetings. The last updates were at the Fall 1989 ASNT Conference and the JANNAF NDT meeting, April 1990. A presentation was given to the DoD community in November 1990.

### **The DoD-NDT Program Plan**

The purpose of this plan is to define the coordinated management program for standardization effort in the Nondestructive Testing and Inspection Area (NDTI). The Plan reflects agreement and commitment by the military services in the accomplishment of specific tasks within scheduled milestones. The Plan is the principal source of management information required for decision making at all levels within the DoD.

Revision 4 of the Plan was approved October 1989. It contains the standardization tasks and thoughts projected for the next two years. Many of the 18 tasks listed involve NGS writing bodies to some extent. The most used military documents include MIL-STD-1949A, Magnetic Particle Inspection; MIL-STD-6866, Penetrant Inspection (which project was completed in the last program plan); MIL-STD-410, Qualification and Certification of NDTI Personnel; MIL-STD-453, Radiographic Inspection; MIL-I-2154, Inspection, Ultrasonic, Wrought Metals, Process For; and MIL-I-6870, Inspection Requirements, Nondestructive for Aircraft and Missile Materials and Parts (Magnetic Particle, Penetrants, Radiography, Ultrasonic, Eddy Current). MIL-STD-271F(SH) Nondestructive Testing Requirements is intended for shipyard use but enjoys wider usage. MIL-STD-1949, MIL-STD-6866, MIL-STD-453, and MIL-STD-

2154 have already been put into ASTM format and balloted. DoD has no objection to cancelling its documents and superseding them with non-Government standards as long as the DoD requirements are carried over into the NGS. Once the NGS is published by its organization, it is then sent for DoD consideration to ensure acceptability. As already stated, initial and subsequent drafts of the NGS should have been coordinated with the DoD.

The following tasks of the current Program Plan are outlined and comments are welcome. DoD invites your interest in our tasks.

#### *MIL-STD-410 Personnel Qualification*

Proposed MIL-STD-410E specifies the qualification and certification requirements for non-destructive testing/nondestructive inspection personnel. Previous revisions of this specification addressed the requirements for personnel using penetrant, magnetic particle, ultrasonic, eddy current, and radiographic nondestructive testing/nondestructive inspection methods. This revision adds detailed requirements for acoustic emission and neutron radiographic methods as well as general requirements for any other nondestructive method for determining the acceptability of a product. In addition, this revision upgrades the designation of Level I, eliminates the Level I Special, adds an instructor level of qualification, and adds a recertification requirement for Level III. This document was published in January 1991.

#### *Visual Acuity Requirements for Radiographers*

To establish visual acuity test targets (transparencies) for measurement of visual acuity. Currently six sets of 50 transparencies have been produced. A protocol has been developed that will be used with the transparencies. A round-robin evaluation indicates that some images may be too readily detected and not provide adequate discrimination. There is a great deal of interest in this project. The transparencies could have carryover into other NDT methods.

#### *Secondary Acoustic Emission Transducer Calibration*

A technical outline of one possible secondary calibration method has been developed and distributed to ASTM E07.04.02. Development of a second method involving transient methods and data processing continues. Outlines of two possible secondary calibration methods were presented and discussed at the January 1988 meeting of ASTM E07.04.02 on AE sensors. Subsequently, considerable work was done on a laboratory prototype calibration setup using a plate 30 by 36 by 1-1/4 in. (76.2 by 91.44 by 3.175 mm) and the results compared with the results from the primary calibration. There are significant differences in the results attributable to the large [approximately 3.4 in. (1.90 mm)] diameter aperture of the test (commercial) transducer.

An understanding of the origins of the differences is being developed. The latest results using a steel transfer block approximately 16-1/4 by 16-1/4 by 7-1/2 in. (41.275 by 41.275 by 19.05 mm) appear to be very promising if a breaking glass capillary is used as the input and if the voltage-time waveform is truncated before the arrival of boundary reflections. Some additional effort will be required to complete this understanding and an acceptable secondary calibration method; however, significant progress has been made and it would seem all major technical problems are resolved. A draft document could begin in early January 1992.



*MIL-STD-1907—Penetrant and Magnetic Particle Inspection, Soundness Requirements for Materials, Parts and Weldments*

This standard was initially published with an incorrect number (MIL-STD-350). MIL-STD-1907 was published 7 Sept 1989. A Notice 1 published 22 March 1990 corrects a typographical error.

*Eddy Current Coil Characterization*

A military standard is being developed by NIST, Boulder, CO, which will be suitable for use in the field for calibrating eddy current coils. NIST/DOD has established that military depot and field level organizations are not the appropriate places to make eddy current probe characterization measurements. Presently, we are rewriting a draft military standard to require probe manufacturers to supply characterization measurements with the probes. The consensus of eddy current users with whom we have spoken is that this is a reasonable approach. It was pointed out that manufacturers of ultrasonic transducers are already required to provide these kinds of measurements on their products. Our revision of the draft standard will reflect a slightly different approach to the test method in that we will use a slotted block to produce the impedance probe response and we will require a d-c resistance measurement of the probe itself that can be verified by the procuring activity. We will be sending the revised document out for coordination when the changes have been completed.

*MIL-STD-271, Nondestructive Testing Requirements for Metals*

Since this document is intended for use on Navy ships and has been specifically designed for that purpose, it is not feasible to replace it with a non-Government document. Instead, the current approach is to create a table of non-Government documents that can be used alternatively for particular sections of MIL-STD-271.

Currently, non-Government documents are being evaluated by the NAVSEA NDE working group to determine which are acceptable to use as alternatives. Some documents that are being evaluated include the American Bureau of Shipyards (ABS) Rules for Nondestructive Inspection of Hull Welds, ASME Section V, ASTM Practice for Liquid Penetrant Inspection Method (E 165), ASTM Practice for Magnetic Particle Examination (E 709), and ASTM Guide for Radiographic Testing (E 94).

*MIL-STD-XX40 Nondestructive Testing Acceptance Criteria*

This standard will combine NAVSEA 0900-003-8000 "Visual, PT, MT Acceptance Standards" and applicable portions of NAVSEA 0900-LP-006-3010 "UT Inspection Procedure and Acceptance Standards for Welds," and NAVSEA 0900-003-9000 "Radiographic Acceptance Standards" to provide a single document containing acceptance standards.

Since this document is the summation of acceptance criteria for many NAVSEA documents, it is unlikely that it can be replaced by a non-Government document. However, the current approach is to create a table of non-Government documents that can be used alternatively for particular sections of MIL-STD-XX40. Some documents that will be evaluated for use as alternatives include the ABS Rules for Nondestructive Inspection of Hull Welds, ASME Section V and ASTM Reference Photographs for Liquid Penetrant Inspection (E 433).

*MIL-I-6870, Inspection Program Requirements, Nondestructive for Aircraft and Missile, Materials and Parts*

The Air Force has written a contract for the revision of this document. Due to the extensive work involved, the contract was extended. A draft document is due early 1991.

**MIL-STD-453C Inspection Radiographic**

A draft version of MIL-STD-453D, dated July 1990, was circulated August 1990 for a three-month coordination. In the General and Detail Requirements Section, there are numerous paragraphs with changes from MIL-STD-453C. The draft also contains information on storage of radiographs and reproduction of radiographs. An Appendix A, which was first included in a Notice 1 to MIL-STD-453C for qualification of equipment operations and procedures, is now part of the new draft. The Appendix A (for Army use) contains data item descriptions (DIDs) which ensure that the necessary parameters for performing radiographic testing are correctly noted. Comments are presently being studied.

*MIL-STD-2175, Castings, Classification and Inspection*

The military standard is being reviewed so that industry can readily comply with the requirements set therein. MIL-STD-1907 has been added. ASTM Reference Radiographs for Inspection of Aluminum and Magnesium Die Castings (E 505) will be added to account for die castings. The initial draft has just completed coordination and the comments are being studied.

*Standard Guide for the Application Specific Selection of Acoustic Emission Sensors MIL-HDBK-788—published 25 JULY 89*

The use of acoustic emission (AE) testing on major weapons systems is growing rapidly. However, each class of applications places its own demands on the AE system, particularly on the choice of sensors. Dozens of different sensor types are available and have been designed to maximize particular attributes. This handbook serves as a guide to assist the practitioner in selecting sensors most appropriate for a particular application.

*MIL-STD-1949B, Magnetic Particle Inspection*

A draft of MIL-STD-1949B was circulated in August 1990 to both government and industry users. Changes in the document include a test outlined in AMS 2641 for determination of wet particle contamination and sections on internal part inspection. Modifications from this draft will be reflected in the ASTM version of this document. (See new activities section of this paper for magnetic particle inspection using shims.)

The DoD is working closely with ASTM in writing an ASTM version of the military document. The approach is to develop both a tutorial document (completely revised E 709) and a requirements-driven document (MIL-STD-1949B in ASTM format basically). The magnetic particle inspection area presents an ideal situation in which DoD and ASTM are working together for the betterment of the NDT community.

*MIL-HDBK-728, Nondestructive Testing*

Replaces many military NDT handbooks. This handbook can easily be revised. Defense Logistics Agency may use it as an instructional tool for training purposes. The document is

now being updated. Section 3 on magnetic particle inspection will be coordinated by July 1992.

*MIL-STD-2154, Inspection, Ultrasonic*

The electronic equipment requirements table will be changed to allow for better defined and more realistic equipment qualification requirements. This document has been formatted for ASTM ballot. If acceptable by the ASTM community, the military standard will be cancelled. A draft revision was coordinated in the fourth quarter of FY 90. Presently the document is being worked on in ASTM Committee E7.06.

*ASTM EXXXX, Radiographic Inspection for Soundness of Welds in Aluminum by Comparison with Graded ASTM Reference Radiographs*

This document is being developed in conjunction with ASTM E7.02. At the June 1990 ASTM meeting, data were presented on the preparation of aluminum weld reference radiographs. The Subcommittee reviewed the prototype radiographs of coarse and fine porosity in thick [1/2-in. (24.13 mm)] aluminum plate.

*MIL-STD-XXX, Radioscopy*

Draft 5 of a military standard is in coordination with DoD and ASTM E7.02 members. This draft essentially replaces Paragraph 5.2 of ASTM E 1255, which details the general practice. The purpose of this proposed military standard is to prescribe the radioscopy inspection requirements for all materials. Using ASTM E 1255 as the reference document, qualification of all aspects of radioscopy systems and the day-to-day control of their operation are itemized. This standard may allow radioscopy inspection, when determined by the Level III radiographic inspector of the contracting agency, to:

1. Replace radiographic inspection in existing applications with radioscopy methods, when equal or better inspection can be obtained.
2. Use radioscopy in new applications, where the contractually agreed quality level criteria can be met.

*MIL-STD-2195(SH), Inspection and Detection of Measurement of Dealloying Corrosion on Aluminum Bronze and Nickel-Aluminum Bronze Components*

MIL-STD-2195(SH) was published 28 April 1989.

*Eddy Current Inspection of Heat Exchanger Tubing on Ships of the U.S. Navy*

This document contains NDE requirements for eddy current in situ inspection of condenser and heat exchanger tubing. The proposed document will replace NAVSEA 0905-475-3010 and incorporate the latest techniques, technology, and equipment currently available for eddy current tubing inspection. An ASTM standard practice is available for this inspection [ASTM Practice for In-Situ Electromagnetic (Eddy Current) Examination of Nonmagnetic Heat Exchanger Tubes (E 690)]. However, the ASTM standard is very general and primarily intended as "guidance" document. At this time, it is not feasible to use E 690 for Navy applications.

As long-term effort, the ASTM committee will be requested to consider revising ASTM E

690 (or generate a new ASTM standard) to cover these inspections. However, it is recognized that this may not be feasible due to the specific Navy requirements in the document.

### New Activities

#### *Shims for Magnetic Particle Inspections*

A reliable method for inspection system verification, according to MIL-STD-1949A, Magnetic Particle Inspection, is to use representative test parts containing defects of the type, location, and size specified in the acceptance requirements. When actual production parts are not available, then fabricated test parts with artificial defects must be used. Many people have asked whether shims can be used instead. There are many shims such as the Pie Gauge, Burmah Castrol Strips, and the QQI shims. Currently the DoD answer is "no."

A new study by NIST/DoD carried out by Lydon Swartzendruber of NIST will attempt to further answer the question. He has prepared a rough draft of a Standard Practice for Magnetic Particle Examination Using Shims. This draft document covers the use of shims to qualify and to verify magnetic particle test procedures. It is applicable only to the continuous method of magnetic particle inspection. It is especially recommended for use with the wet continuous method and when multidirectional magnetization is being used. This draft will be discussed at the January 1991 ASTM meeting.

#### *Naval Sea Systems Command (NAVSEA)*

NAVSEA has always had service-peculiar documents such as NAVSEA 0900-LP-003-8000, Surface Inspection Acceptance Standards For Metals. These documents did not appear in the DODISS and unless one had special involvement with NAVSEA, did not know of their existence.

Presently NAVSEA is incorporating requirements from several service-peculiar documents into one easy-to-obtain military standard. By doing this, the knowledge contained in these difficult-to-obtain documents will become available to all NDT users.

#### *JANNAF Nondestructive Evaluation Subcommittee*

The Joint Army-Navy-NASA-Air Force (JANNAF) Interagency Propulsion Committee is comprised of representatives from the Department of Defense (DoD) military services and the National Aeronautics and Space Administration (NASA) and is referred to as JANNAF. The purpose of JANNAF is to effect coordination and solution of propulsion problems and to promote the exchange of technical information in the field of missile, space, and gun propulsion technology based upon chemical or electrical energy release. My involvement is in the JANNAF Nondestructive Evaluation Subcommittee. This Subcommittee is comprised of five panels. They consist of the Advanced Inspection and Implementation, Solid Propulsion Unique Issues, Liquid Propulsion Unique Issues, Space Systems Issues, and the Component Inspection Standards Panels.

I am co-chairman of the Component Inspection Standards Panel. The Panel's task in general is to improve propulsion systems reliability by developing NDE standards and protocols which will include standardized calibration, inspection, and data analysis procedures, and common terminology. More specifically, the panel is now involved with developing a database of all NDT standards.

Development of the database is proceeding nicely thanks to the efforts of Bill St. Cyr from NASA Stennis Space Center, Mississippi. Bill has compiled an all-inclusive dBase 3 listing

which includes nearly all aspects of NDE information such as standards, practices, procedures, books, handbooks, etc. Included in the database are DoD, API, ASME, ASTM, SAE, AIA (NAS document), ASNT, ASM, and AWS documents. Listed information includes area (MPI, PT, ET, etc.), source (DoD, ASTM, etc.), type (book, standard, etc.), document number, revision date, title and abstract, and scope or contents. The information is on two diskettes. Future plans include having the Nondestructive Testing Information Analysis Center (NTIAC) become the source for the diskette. NTIAC is operated for the U.S. Department of Defense by Texas Research Institute, Austin, Texas. Another option is to publish a military document with diskettes in the same fashion as an ASTM document with radiographs.

There is much interest in NDE inspection of adhesive joints. A document being studied is a state-of-the-art review on Nondestructive Evaluation of Adhesive Bond Quality by G. Light and H. Kwon, which is available from NTIAC.

A newly proposed project by John Moulder, Iowa State, explores electronic calibration of NDE inspection equipment, especially UT, RT, and ET probes and sensors. This involves identifying and promoting promising avenues of research that have potential applicability to electronically calibrated transducers which would provide NDE information that could also be used to determine material properties.

It is important that JANNAF information be interchanged with as large a body of technical persons as possible. JANNAF results could be published as ASTM documents. Persons participating in JANNAF meetings are usually different individuals than those who attend ASTM meetings. Most companies involved in JANNAF participate in NASA projects.

#### **DoD's Initiatives in International Standardization**

International standardization treaty and agreement documents may involve material and engineering practices. Examples of such documents are North Atlantic Treaty Organization Standardization Agreements (STANAGs), Quadripartite Army Standardization Agreements (QSTAGs), Quadripartite Navy Standardization Agreements (NAMSTAGs), and the Air Standardization Coordinating Committee (SCC) Air Standards (as produced by the Armies, Navies and Air Forces of United States, United Kingdom, Canada, Australia, including New Zealand in the case of ASCC Air Standards).

My knowledge of these groups is limited to participation on an American, British, Canadian and Australian (ABCA) armies team whose mission includes achieving the highest possible degree of interoperability through standardization of nondestructive testing techniques. The group is called an ABCA Quadripartite Working Group on Proofing, Inspection and Quality Assurance (QWG/PIQA). Its function is to agree that the methods that are followed during the manufacture and maintenance of material under the design control of each army conform to the accepted standard of that army. Its purpose is not to write methodology. An important point is that the standards agreed to are interoperable and mutually acceptable in many applications and that they form a body of technical information which should be available to technical organizations engaged in nondestructive testing in each army. The ABCA armies further agree to consult and, whenever possible, reach mutual agreement before introducing changes to any of their documents.

The NDT section of QWG/PIQA is actively preparing documents called QSTAGS, which are Quadripartite Standardization Agreements. QSTAGs are formal agreements between two or more armies defining the standardization achieved and to be maintained. The agreements are reviewed by armies for currency and validity on a continuing basis. The U.S. Army is actively involved in developing four QSTAGs. QSTAG 933, Calibrations of Ultrasonic Test Equipment by Means Other Than Test Blocks, uses ASTM E 1324, Guide For Measuring Some Electronic Characteristics of Ultrasonic Examination Instruments, as the acceptable

U.S. document. Another task, QSJAG 724 on Calibration of Ultrasonic Test Equipment With Standard Test Blocks, uses ASTM Practice for Evaluating Performance Characteristics of Ultrasonic Pulse-Echo Testing Systems Without the Use of Electronic Measurement Instruments (E 317) as the U.S.-accepted document. Other projects involve developing QSTAGS on conductivity measurement and coating thickness measurement. The conductivity QSTAG will involve MIL-STD-1537B, Electrical Conductivity Test For Measurement of Heat Treatment of Aluminum Alloys, Eddy Current Method, as the acceptable U.S. standard. QSTAG 938 on Coating Thickness Measurement involves ASTM E 376, "Standard Practice For Measuring Coating Thickness By Magnetic Field or Eddy-Current (Electromagnetic) Test Methods."

The Canadian Army is involved with the writing of QSTAGs for certification requirements for nondestructive testing personnel. The following QSTAGs have been developed and ratified for individual nondestructive testing methods: MPI (QSTAG 612), LPI (QSTAG 771), Radiography (QSTAG 274), Ultrasonics, (QSTAG 335), and Eddy Current (QSTAG 937).

Inactive projects include calibration of ultrasonic equipment and magnetic particle inspection.

### Summary

The purpose of this paper has been to describe how DoD does business in the area of adoption, to describe on-going tasks in the Standardization Program Plan for NDT, and to invite the NDT community to participate in the tasks. The end product of these tasks can and usually is a NGS.

A brief overview was given of DoD's efforts on a JANNAF (Joint Army, Navy, NASA, and Air Force) Subcommittee for NDE. Projects were outlined, and a highly successful task of building a database of NDE documents was described.

Projects in which the U.S. Army is involved in an ABCA (American, Britain, Canada, and Australia) international standardization group are described. This effort involves not the writing standards but using or modifying standards so that they are interoperable and mutually accepted.

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